Calcified Tissue Research

Volume 26 1978

Editor-in-Chief

L.V. Avioli
Washington University School of Medicine, The Jewish Hospital of St. Louis
216 South Kingshighway, St. Louis, Missouri 63110

Editorial Board

W.A. Armstrong
Minneapolis, Minnesota

A. Ascenzi
Rome, Italy

N. Bell
Indianapolis, Indiana

O.L.M. Bijvoet
Leiden, Netherlands

N.S. Bricker
Los Angeles, California

A. Caniggia
Siena, Italy

E. Carafoli
Zürich, Switzerland

L. Chase
St. Louis, Missouri

D.H. Copp
Vancouver, British Columbia

H. DeLuca
Madison, Wisconsin

E.D. Eanes
Bethesda, Maryland

J.C. Elliott
London, England

B. Engfeldt
Huddinge, Sweden

H. Fleisch
Bern, Switzerland

B.A. Friedman
Cleveland, Ohio

P.J. Gaillard
Leiden, Netherlands

P. Gallop
Boston, Massachusetts

M. Glimcher
Boston, Massachusetts

J. Habener
Boston, Massachusetts

J. Haddad
St. Louis, Missouri

A. Harell
Tel Aviv, Israel

M. Haussler
Tucson, Arizona

R. Heaney
Omaha, Nebraska

D.S. Howell
Miami, Florida

W.S.S. Jee
Salt Lake City, Utah

A. Kahn
St. Louis, Missouri

L. Klein
Cleveland, Ohio

S. Krane
Boston, Massachusetts

F. Kuhlencordt
Hamburg, Germany

J.L. Matthews
Dallas, Texas

P. Meunier
Lyon, France

P. Munson
Chapel Hill, North Carolina

B.E.C. Nordin
Leeds, England

A.W. Norman
Riverside, California

M. Owen
Oxford, England

C. Pak
Dallas, Texas

A.M. Parfitt
Detroit, Michigan

J.A. Parsons
London, England

A.S. Posner
New York, New York

L.G. Raisz
Farmington, Connecticut

J.J. Reynolds
Cambridge, England

R. Robinson
Baltimore, Maryland

R.G.G. Russell
Sheffield, England

R. Schenk
Bern, Switzerland

D.B. Scott
Bethesda, Maryland

L. Sherwood
Chicago, Illinois

L. Singer
Minneapolis, Minnesota

E. Slatopolsky
St. Louis, Missouri

S.W. Stanbury
Manchester, England

S. Teitelbaum
St. Louis, Missouri

G. Vaes
Brussels, Belgium

A. Veis
Chicago, Illinois

M. Walser
Baltimore, Maryland

R.H. Wasserman
Ithaca, New York

J.A. Weatherell
Leeds, England

K.M. Wilbur
Durham, North Carolina

The exclusive copyright for all languages and countries, including the right for photomechanical and other reproductions, is transferred to the publisher.

The use of registered names, trademarks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

Alle Rechte, einschließlich das der Übersetzung in fremde Sprachen und das der fotomechanischen Wiedergabe oder einer sonstigen Vervielfältigung, vorbehalten. Jedoch wird gewerblichen Unternehmen für den innerbetrieblichen Gebrauch nach Maßgabe des zwischen dem Börsenverein des Deutschen Buchhandels e.V. und dem Bundesverband der Deutschen Industrie abgeschlossenen Rahmenabkommens die Anfertigung einer fotomechanischen Vervielfältigung gestattet. Wenn für diese Zeitschrift kein Pauschalabkommen mit dem Verlag vereinbart worden ist, ist eine Wertmarke im Betrage von DM 0,40 pro Seite zu verwenden.
Der Verlag läßt diese Beträge den Autorenverbänden zufließen.

Die Wiedergabe von Gebrauchsnamen, Handelsnamen, Warenbezeichnungen usw. in dieser Zeitschrift berechtigt auch ohne besondere Kennzeichnung nicht zu der Annahme, daß solche Namen im Sinne der Warenzeichen- und Markenschutz-Gesetzgebung als frei zu betrachten wären und daher von jedermann benutzt werden dürften.

Printed by Universitätsdruckerei H. Stürtz AG, Würzburg

Printed in Germany. — © by Springer-Verlag Berlin Heidelberg 1978

Author Index

Abatangelo, G., Daga-Gordini, D., Castellani, I., Cortivo, R.: Some Observations on the Calcium Ion Binding to the Eggshell Matrix 247
Aloia, J.F., see Cohn, S.H., et al. 1
Anastassiades, T., Puzic, O., Puzic, R.: Effect of Solubilized Bone Matrix Components on Cultured Fibroblasts Derived from Neonatal Rat Tissues 173
Anderson, C., Danylchuk, K.D.: Effect of Chronic Low-Level Cadmium Intoxication on the Haversian Remodeling System in Dogs 143
Andres, R.Y., see Teitelbaum, S.L., et al. 203
Ashton, B.A., see Triffitt, J.T., et al. 155
Avioli, L.V., see Baran, D.T., et al. 103
Baran, D.T., Bergfeld, M.A., Teitelbaum, S.L., Avioli, L.V.: Effect of Testosterone Therapy on Bone Formation in an Osteopathic Hypogonadal Male 103
Baron, R., see Vignery, A. 23
Baud, C.A., see Tochon-Danguy, H.J., et al. 259
Becker, R.O.: Review – Electrical Osteogenesis – Pro and Con 93
Bergfeld, M.A., see Baran, D.T., et al. 103
Bethune, J.E., see Weringer, E.J., et al. 71
Biltz, R.M., see Pellegrino, E.D. 191
Birkenhäger, J.C., see Juttmann, J.R., et al. 119
Boer, H.H., see Zylstra, U., et al. 271
Boivin, G., see Tochon-Danguy, H.J., et al. 259
Boland, A.R. de, Skliar, M.I., Gallego, S., Esparza, M., Boland, R.L.: Potentiation of the Effects of *Solanum malacoxylon* Extracts on Rat Intestinal Phosphate and Calcium Absorption by Incubation with Ruminal Fluid 215
Boland, R.L., see Boland, A.R. de, et al. 215
Bonel, G., see LeGeros, R.Z., et al. 111
Borg, T.K., Runyan, R.B., Wuthier, R.E.: Correlation of Freeze-Fracture and Scanning Electron Microscopy of Epiphyseal Chondrocytes 237
Borggreven, J.M.P.M., see Driessens, F.C.M., et al. 127
Bowen, R.L., see Misra, D.N., et al. 139
Boyde, A., Sela, J.: Scanning Electron Microscope Study of Separated Calcospherites from the Matrices of Different Mineralizing Systems 47
Brown, W.A.B., see Gibson, C.J., et al. 29
Buddecke, E., see Schmidt, A., et al. 163
Burger, E.H., Matthews, J.L.: Cellular Calcium Distribution in Fetal Bones Studied with Pyroantimonate 181
Care, A.D., see Fox, J. 243
Castellani, I., see Abatangelo, G., et al. 247
Chandler, B., see Phillips, H.B., et al. 85
Christensen, M.S., see Larsen, M.J., et al. 199
Clifton-Bligh, P., see Posen, S., et al. 107
Cohn, S.H., Aloia, J.F., Letteri, J.M.: Editorial – Noninvasive Measurements of Bone Mass and Their Clinical Significance 1
Cooke, N.E., see Teitelbaum, S.L., et al. 203
Cortivo, R., see Abatangelo, G., et al. 247
Courpron, P., see Lips, P., et al. 13
Daga-Gordini, D., see Abatangelo, G., et al. 247
Danylchuk, K.D., see Anderson, C. 143
Driessens, F.C.M., van Dijk, J.W.E., Borggreven, J.M.P.M.: Biological Calcium Phosphates and Their Role in the Physiology of Bone and Dental Tissues. I. Composition and Solubility of Calcium Phosphates 127
Dristas, J.A., see Puche, R.C., et al. 61
Dziak, R.: Effects of Vitamin D_3 Metabolites on Bone Cell Calcium Transport 65
Ellender, G., Sewell, D.K.B., Ham, K.N., Storey, E.: Lead-Loaded Ion-Exchange Resin Bead as a Calcergen . . . 253
Esparza, M., see Boland, A.R. de, et al. 215
Faienza, H., see Puche, R.C., et al. 61
Fox, J., Care, A.D.: Stimulation of Duodenal and Ileal Absorption of Phosphate in the Chick by Low-Calcium and Low-Phosphate Diets 243
Gallego, S., see Boland, A.R. de, et al. 215
Geoffroy, M., see Tochon-Danguy, H.J., et al. 259
Gibson, C.J., Thornton, V.F., Brown, W.A.B.: Incorporation of Tetracycline into Impeded and Unimpeded Mandibular Incisors of the Mouse 29
Guo, M.K., Messer, H.H.: A Comparison of Ca^{3+}-, Mg^{2+}-ATPase and Alkaline Phosphatase Activities of Rat Incisor Pulp 33
Hagenouw-Taal, J.C.W., see Juttmann, J.R., et al. 119
Hahn, T.J., see Teitelbaum, S.L., et al. 203
Ham, K.N., see Ellender, G., et al. 253
Hayase, K., see Puche, R.C., et al. 61
Heersche, J.N.M.: Mechanism of Osteoclastic Bone Resorption: A New Hypothesis 81
Hnatowich, D.J., see Neer, R., et al. 5
Immelman, A.R., see Thonar, E.J.-M.A., et al. 19
Ishikawa, Y., see Northington, F.K., et al. 227
Juster, G., see Puche, R.C., et al. 61
Juttmann, J.R., Hagenouw-Taal, J.C.W., Lameyer, L.D.F., Ruis, A.M., Birkenhäger, J.C.: Intestinal Calcium Absorption, Serum Phosphate, and Parathyroid Hormone in Patients with Chronic Renal Failure and Osteodystrophy Before and During Hemodialysis 119
Kahn, A.J., see Teitelbaum, S.L., et al. 203
Kiang, D.T.: Effect of Mithramycin on Bone β-Glucuronidase and Resorption 209
Kovoor, J.: Natural Calcification of the Prosomatic Endosternite in the Phalangiidae (Arachnida: Opiliones) . . . 267
Lameyer, L.D.F., see Juttmann, J.R., et al. 119
Larsen, M.J., Melsen, F., Mosekilde, L., Christensen, M.S.: Effects of a Single Dose of Fluoride on Calcium Metabolism 199
LeGeros, R.Z., Bonel, G., Legros, R.: Types of "H_2O" in Human Enamel and in Precipitated Apatites 111

Legros, R., see LeGeros, R.Z., et al. 111
Letteri, J.M., see Cohn, S.H., et al. 1
Lips, P., Courpron, P., Meunier, P.J.: Mean Wall Thickness of Trabecular Bone Packets in the Human Iliac Crest: Changes with Age 13
Liskova-Kiar, M., Proschek, L.: Influence of Partially Purified Extracts of *Solanum malacoxylon* on Bone Resorption in Organ Culture 39
Luben, R.A., see Wadkins, C.L. 51
Lyons, G., see Thonar, E.J.-M.A., et al. 19
Mattamal, G.J., see Misra, D.N., et al. 139
Matthews, J.L., see Burger, E.H. 181
Melsen, F., Mosekilde, L.: Tetracycline Double-Labeling of Iliac Trabecular Bone in 41 Normal Adults 99
Melsen, F., see Larsen, M.J., et al. 199
Messer, H.H., see Guo, M.K. 33
Meunier, P.J., see Lips, P., et al. 13
Misra, D.N., Bowen, R.L., Mattamal, G.J.: Surface Area of Dental Enamel, Bone, and Hydroxyapatite: Chemisorption from Solution 139
Mosekilde, L., see Larsen, M.J., et al. 199
Mosekilde, L., see Melsen, F. 99
Narbaitz, R., Tolnai, S.: Effects Produced by the Administration of High Doses of 1,25-Dihydroxycholecalciferol to the Chick Embryo 221
Neer, R., Tully, G., Schatz, P., Hnatowich, D.J.: Use of Stable Calcium-48 in the Clinical Measurement of Intestinal Calcium Absorption 5
Norimatsu, H., see Talmage, R.V., et al. 149
Northington, F.K., Oglesby, T.D., Ishikawa, Y., Wuthier, R.E.: Localization of Prostaglandin Synthetase in Chicken Epiphyseal Cartilage 227
Oglesby, T.D., see Northington, F.K., et al. 227
Oldham, S.B., see Weringer, E.J., et al. 71
Osmetti, G., see Puche, R.C., et al. 61
Owen, M.E., see Triffitt, J.T., et al. 155
Owen-Jones, S., see Phillips, H.B., et al. 85
Pak, C.Y.C.: Editorial – Calcium Urolithiasis: Is It Analogous to Bone Formation? 195
Pellegrino, E.D., Blitz, R.M.: Calcium Phosphate Carbonate Transformations in Renal Calculi 191
Phillips, H.B., Owen-Jones, S., Chandler, B.: Quantitative Histology of Bone – A Computerized Method of Measuring the Total Mineral Content of Bone 85
Posen, S., Clifton-Bligh, P., Wilkinson, M.: Paget's Disease of Bone and Hyperparathyroidism: Coincidence or Causal Relationship? 107
Proschek, L., see Liskova-Kiar, M. 39
Puche, R.C., Faienza, H., Valenti, J.L., Juster, G., Osmetti, G., Hayase, K., Dristas, J.A.: On the Nature of Arterial and Lung Calcifications Induced in Cattle by *Solanum glaucophyllum* 61
Puzic, R., see Anastassiades, T., et al. 173
Rodegerdts, U., see Schmidt, A., et al. 163
Ruis, A.M., see Juttmann, J.R., et al. 119
Runyan, R.B., see Borg, T.K., et al. 237
Schatz, P., see Neer, R., et al. 5
Schmidt, A., Rodegerdts, U., Buddecke, E.: Correlation of Lysozyme Activity with Proteoglycan Biosynthesis in Epiphyseal Cartilage 163
Sela, J., see Boyde, A. 47
Sewell, D.K.B., see Ellender, G., et al. 253
Skliar, M.I., see Boland, A.R. de, et al. 215
Sminia, T., see Zylstra, U., et al. 271
Storey, E., see Ellender, G., et al. 253
Sweet, M.B.E., see Thonar, E.J.-M.A., et al. 19
Talmage, R.V., Vander Weil, C.J., Norimatsu, H.: A Reevaluation of the Cause of Acute Hypercalcemia following Intravenous Administration of Lead Acetate 149
Teitelbaum, S.L., Andres, R.Y., Cooke, N.E., Hahn, T.J., Kahn, A.J.: Inhibition of Parathyroid Hormone-Induced Fetal Rat Bone Resorption in Vitro by Nerve Growth Factor 203
Teitelbaum, S.L., see Baran, D.T., et al. 103
Thonar, E.J.-M.A., Sweet, M.B.E., Immelman, A.R., Lyons, G.: Hyaluronate in Articular Cartilage: Age-Related Changes 19
Thornton, V.F., see Gibson, C.J., et al. 29
Tochon-Danguy, H.J., Geoffroy, M., Boivin, G., Baud, C.A.: Mineral Substance of Bone Tissue and of Experimental Cutaneous Calcinosis in Rats: Chemical Analysis and ESR Study 259
Tolnai, S., see Narbaitz, R. 221
Triffitt, J.T., Owen, M.E., Ashton, B.A., Wilson, J.M.: Plasma Disappearance of Rabbit α_2 HS-Glycoprotein and Its Uptake by Bone Tissue 155
Tully, G., see Neer, R., et al. 5
Valenti, J.L., see Puche, R.C., et al. 61
Vander Weil, C.J., see Talmage, R.V., et al. 149
van Dijk, J.W.E., see Driessens, F.C.M., et al. 127
Vignery, A., Baron, R.: Effects of Parathyroid Hormone on the Osteoclastic Pool, Bone Resorption and Formation in Rat Alveolar Bone 23
Wadkins, C.L., Luben, R.A.: Effects of Fluoride on In Vitro Calcification of Tendon Matrix 51
Weringer, E.J., Oldham, S.B., Bethune, J.E.: A Proposed Cellular Mechanism for Calcium Transport in the Intestinal Epithelial Cell 71
Wilkinson, M., see Posen, S., et al. 107
Wilson, J.M., see Triffitt, J.T., et al. 155
Wuthier, R.E., see Borg, T.K., et al. 237
Wuthier, R.E., see Northington, F.K., et al. 227
Zylstra, U., Boer, H.H., Sminia, T.: Ultrastructure, Histology, and Innervation of the Mantle Edge of the Freshwater Pulmonate Snails *Lymnaea stagnalis* and *Biomphalaria pfeifferi* 271

Subject Index

A

Absorption 71–80, 243–245
–, calcium see Calcium absorption 5–12, 71–80, 119–126
–, intestinal epithelium 71–80
–, mitochondria 71–80
–, phosphate 243–245
– –, chick 243–245
– –, diet, calcium 243–245
– –, diet, phosphorus 243–245
–, potassium-pyroantimonate 71–80
Adsorbed and lattice H_2O (human enamel) 111–118
Age-related changes (osteoarthrosis) 19–22
Alkaline phosphatase (ATPase) 33–38
Amount of bone (bone remodeling) 13–18
Appositional growth (electrical osteogenesis) 93–97
Appositional rate (bone biopsy) 99–102
Arterial calcification 61–64
Articular cartilage (osteoarthrosis) 19–22
ATPase 33–38
–, alkaline phosphatase 33–38
–, dental pulp 33–38

B

Biomphalaria pfeifferi (shell formation) 271–287
Biosynthesis (epiphyseal cartilage) 227–236
Bone 13–18, 47–50, 81–84, 85–90, 139–142, 155–161, 209–213
–, amount of 13–18
–, chemisorption 139–142
–, computer 85–90
–, densitometry 85–90
–, histology 85–90
–, matrix vesicles 47–50
–, microradiography 85–90
–, mithramycin 209–213
–, osteoclasts 81–84
–, plasma protein 155–161
Bone biopsy 99–102
–, appositional rate 99–102
–, tetracycline labeling 99–102
Bone cells 65–70
–, calcium transport 65–70
–, vitamin D_3 65–70
Bone culture (*Solanum malacoxylon*) 39–46
Bone formation (osteoporosis) 103–106
Bone growth (electrical osteogenesis) 93–97
Bone histomorphometry (bone remodeling) 13–18
Bone mass 1–4
–, bone mineral content 1–4
–, cortical thickness 1–4
–, neutron activation 1–4
–, osteopenia 1–4
–, osteoporosis 1–4
–, photon beam absorptiometry 1–4
–, radiogrammetry 1–4
–, skeletal mass 1–4
Bone matrix 173–179
–, fibroblasts 173–179
–, glycosaminoglycans 173–179
–, tissue culture 173–179
Bone mineral 1–4, 259–265
–, calcinosis 259–265
–, calciphylaxis 259–265
–, content (bone mass) 1–4
–, ESR 259–265
–, free radicals 259–265
Bone modeling (parathyroidectomy) 23–28
Bone remodeling 13–18
–, amount of bone 13–18
–, bone histomorphometry 13–18
–, osteopenia 13–18
–, osteoporosis 13–18
Bone repair (electrical osteogenesis) 93–97
Bone resorption (nerve growth factor) 203–208
Bone uptake of lead (lead) 149–153

C

Cadmium, low dose 143–148
–, dogs 143–148
–, Haversian bone remodeling 143–148
Calcification 51–60, 61–64, 267–269
–, arterial 61–64
–, chondroid tissue 267–269
–, collagen 51–60
–, lung 61–64
–, soft tissue 61–64
Calcium 39–46, 71–80, 199–202, 215–219
–, absorption 71–80
–, cellular, see Cellular calcium 181–190
–, fluoride 199–202
–, *Solanum malacoxylon* 39–46, 215–219
Calcium-45 (lead) 149–153
Calcium-48 (calcium absorption) 5–12
Calcium absorption 5–12, 71–80, 119–126
–, calcium-48 5–12
–, parathyroid hormone 119–126
–, renal osteodystrophy 119–126
–, serum phosphorus 119–126
–, stable isotopes 5–12
Calcium phosphates 126–137
–, composition 127–137
–, dissolution 127–137
–, precipitation 127–137
Calcium transport (bone cells) 65–70
Calcium urolithiasis 195–197
–, crystal growth 195–197
–, crystallization 195–197
–, 1,25-dihydroxycholecalciferol 195–197
–, epitaxial growth 195–197

–, hypercalciuria 195–197
–, matrix substance 195–197
–, stone formation 195–197
–, stones of hydroxyapatite 195–197
Calcospherites (matrix vesicles) 47–50
Cartilage 19–22, 47–50, 93–97, 163–172, 227–236
–, electrical osteogenesis 93–97
–, epiphyseal 163–172, 227–236
– –, biosynthesis 227–236
– –, lysozyme 163–172
– –, metabolism 227–236
– –, prostaglandins 227–236
– –, proteoglycan synthesis 163–172
–, matrix vesicles 47–50
–, osteoarthrosis 19–22
Cartilage maturation osteoarthrosis 19–22
Cell processes epiphyseal chondrocytes 237–241
Cellular calcium 181–190
–, chondrocytes 181–190
–, electron microscopy 181–190
–, mineralization 181–190
–, osteoblasts 181–190
Chelicerates (chondroid tissue) 267–269
Chemisorption 139–142
–, bone 139–142
–, enamel 139–142
–, hydroxyapatite 139–142
–, surface area 139–142
Chick (absorption, phosphate) 243–245
Chondrocytes 19–22, 181–190, 237–241
–, cellular calcium 181–190
–, epiphyseal 237–241
– –, cell processes 237–241
– –, freeze-fracture 237–241
– –, membrane particles 237–241
– –, scanning electron microscopy 237–241
–, osteoarthrosis 19–22
Chondroid tissue 267–269
–, calcification 267–269
–, chelicerates 267–269
–, electron microphobe 267–269
–, opilions 267–269
Chondroitin sulfate (osteoarthrosis) 19–22
Collagen 51–60
–, calcification 51–60
–, fluoroapatite 51–60
–, inhibitors 51–60
–, nucleation 51–60
Composition (calcium phosphates) 127–137
Computer (bone) 85–90
Cortical thickness (bone mass) 1–4
Crystal growth (calcium urolithiasis) 195–197
Crystallization (calcium urolithiasis) 195–197

D

Densitometry (bone) 85–90
Dental pulp (ATPase) 33–38
Dentine (matrix vesicles) 47–50
Diet 243–245
–, calcium (absorption, phosphate) 243–245
–, phosphate (absorption, phosphate) 243–245
1,25-dihydroxycholecalciferol 195–197, 221–226
–, bone mineralization 221–226
–, calcium urolithiasis 195–197
–, chick embryo resorbs 221–226
–, hypercalcemia 221–226
–, hypervitaminosis D 221–226
–, *Solanum malacoxylon* 221–226
Dissolution (calcium phosphates) 127–137
Dogs (cadmium, low dose) 143–148

E

Eggshell matrix 247–252
–, pyridine-insoluble matrix 247–252
–, pyridine-soluble matrix 247–252
–, water-soluble matrix 247–252
Elastic cartilage (osteoarthrosis) 19–22
Electrical osteogenesis, see Osteogenesis, electrical 93–97
Electromagnetic field (electrical osteogenesis) 93–97
Electron microphobe (chondroid tissue) 267–269
Electron microscopy (cellular calcium) 181–190
Enamel 111–118, 139–142
–, chemisorption 139–142
–, human 111–118
– –, adsorbed and lattice H_2O 111–118
– –, HPO_4-for-PO_4 and H_2O-for-OH substitutions in apatites 111–118
– –, precipitated apatites 111–118
Epiphyseal cartilage, see Cartilage, epiphyseal 163–172, 227–236
Epiphyseal chondrocytes, see Chondrocytes, epiphyseal 237–241
Epitaxial growth (calcium urolithiasis) 195–197

F

Fibroblasts (bone matrix) 173–179
Fluoride 199–202
–, calcium 199–202
–, parathyroid hormone 199–202
–, phosphate 199–202
Fluoroapatite (collagen) 51–60
Free nerve endings (shell formation) 271–287
Freeze-fracture (epiphyseal chondrocytes) 237–241

G

Glucosamine (plasma protein) 155–161
β-Glucuronidase (mithramycin) 209–213
Glycoprotein (plasma protein) 155–161
Glycosaminoglycans 19–22, 173–179
–, bone matrix 173–179
–, osteoarthrosis 19–22

H

Haversian bone remodeling (cadmium, low dose) 143–148
Histology (bone) 85–90
HPO_4-for-PO_4 and H_2O-for-OH substitutions in apatites (human enamel) 111–118
Human enamel, see Enamel 111–118
Hyaline (electrical osteogenesis) 93–97
Hyaluronate (osteoarthrosis) 19–22
Hydroxyapatite (chemisorption) 139–142
Hypercalcuria (calcium urolithiasis) 195–197
Hyperparathyroidism (Paget's disease) 107–109
Hypogonadism (osteoporosis) 103–106

I

Incisor growth (tetracycline) 29–32
Incisor unimpeded eruption (tetracycline) 29–32
Inhibitors (collagen) 51–60
Insulin (nerve growth factor) 203–208
Intestinal epithelium (absorption) 71–80
Ion-exchange resin 253–258
–, calcification 253–258
–, energy dispersive X-ray analysis 253–258

–, lead toxicity 253–258
–, trauma 253–258

K
Keratan sulfate (osteoarthrosis) 19–22
KT medium (mithramycin) 209–213

L
Lead 149–153
–, bone uptake of lead 149–153
–, calcium-45 149–153
–, plasma calcium 149–153
Lung calcification 61–64
Lymnaea stagnalis (shell formation) 271–287
Lysozyme (epiphyseal cartilage) 163–172

M
Matrix substance (calcium urolithiasis) 195–197
Matrix vesicles 47–50
–, bone 47–50
–, calcospherites 47–50
–, cartilage 47–50
–, dentine 47–50
–, mineralization 47–50
–, SEM 47–50
Membrane particles (epiphyseal chondrocytes) 237–241
Metabolism (epiphyseal cartilage) 227–236
Microradiography (bone) 85–90
Mineralization 47–50, 181–190
–, cellular calcium 181–190
–, matrix vesicles 47–50
Mithramycin 209–213
–, bone 209–213
–, β-glucuronidase 209–213
–, KT medium 209–213
Mitochondria (absorption) 71–80

N
Nerve growth factor 203–208
–, bone resorption 203–208
–, insulin 203–208
–, parathyroid hormone 203–208
Neutron activation (bone mass) 1–4
Nucleation (collagen) 51–60

O
Opilions (chondroid tissue) 267–269
Osteoarthrosis 19–22
–, age-related changes 19–22
–, articular cartilage 19–22
–, cartilage 19–22
–, cartilage maturation 19–22
–, chondrocyte 19–22
–, chondroitin 19–22
–, elastic cartilage 19–22
–, glycosaminoglycans 19–22
–, hyaluronate 19–22
–, keratan sulfate 19–22
–, proteoglycan 19–22
–, xylosyltransferase 19–22
Osteoblasts (cellular calcium) 181–190
Osteoclasts 23–28, 39–46, 81–84
–, bone 81–84
–, parathyroidectomy 23–28
–, resorption 81–84
–, *Solanum malacoxylon* 39–46
Osteogenesis, electrical 93–97
–, appositional growth 93–97
–, bone growth 93–97
–, bone repair 93–97
–, cartilage 93–97
–, electromagnetic field 93–97
–, hyaline 93–97
–, osteogenesis 93–97
–, piezoelectric effect 93–97
–, pseudoarthrosis 93–97
–, regenerative growth process 93–97
Osteopenia 1–4, 13–18
–, bone mass 1–4
–, bone remodeling 13–18
Osteoporosis 103–106
–, bone formation 103–106
–, bone mass 1–4
–, bone remodeling 13–18
–, hypogonadism 103–106
–, testosterone 103–106

P
Paget's disease 107–109
–, hyperparathyroidism 107–109
Parathyroid hormone 23–28, 119–126, 199–202, 203–208
–, calcium absorption 119–126
–, fluoride 199–202
–, nerve growth factor 203–208
–, parathyroidectomy 23–28
Parathyroidectomy 23–28
–, bone modeling 23–28
–, osteoclasts 23–28
–, parathyroid hormone 23–28
Phosphate 199–202, 215–219
–, fluoride 199–202
–, *Solanum malacoxylon* 215–219
Photon beam absorptiometry (bone mass) 1–4
Piezoelectric effect (electrical osteogenesis) 93–97
Plasma calcium (lead) 149–153
Plasma protein 155–161
–, bone 155–161
–, glucosamine 155–161
–, glycoprotein 155–161
Potassium-pyroantimonate (absorption) 71–80
Precipitated apatites (human enamel) 111–118
Precipitation (calcium phosphates) 127–137
Prostaglandins (epiphyseal cartilage) 227–236
Proteoglycan (osteoarthrosis) 19–22
Proteoglycan synthesis (epiphyseal cartilage) 163–172
Pseudoarthrosis (electrical osteogenesis) 93–97
Pyridine-insoluble matrix (eggshell matrix) 247–252
Pyridine-soluble matrix (eggshell matrix) 247–252

R
Radiogrammetry (bone mass) 1–4
Regenerative growth process (electrical osteogenesis) 93–97
Renal osteodystrophy (calcium absorption) 119–126
Resorption 39–46, 81–84
–, osteoclasts 81–84
–, *Solanum malacoxylon* 39–46
Rickets (*Solanum malacoxylon*) 215–219

S
Scanning electron microscopy (epiphyseal chondrocytes) 237–241
SEM (matrix vesicles) 47–50

Serum phosphorus (calcium absorption) 119–126
Shell formation 271–287
–, *Biomphalaria pfeifferi* 271–287
–, free nerve endings 271–287
–, *Lymnaea stagnalis* 271–287
–, ultrastructure 271–287
Skeletal mass (bone mass) 1–4
Soft tissue calcification 61–64
Solanum malacoxylon 39–46, 215–219
–, bone culture 39–46
–, calcium 39–46, 215–219
–, osteoclasts 39–46
–, phosphate 215–219
–, resorption 39–46
–, rickets 215–219
–, vitamin D metabolites 215–219
Stable isotopes (calcium absorption) 5–12
Stone formation (calcium urolithiasis) 195–197
Stones of hydroxyapatite 195–197
Surface area (chemisorption) 139–142

T
Testosterone (osteoporosis) 103–106
Tetracycline 29–32
–, incisor growth 29–32
–, incisor unimpeded eruption 29–32
Tetracycline labeling (bone biopsy) 99–102
Tissue culture (bone matrix) 173–179

U
Ultrastructure (shell formation) 271–287

V
Vitamin D metabolites (*Solanum malacoxylon*) 215–219
Vitamin D_3 (bone cells) 65–70

W
Water-soluble matrix (eggshell matrix) 247–252

X
Xylosyltransferase (osteoarthrosis) 19–22